Contrast media kinetics in multiparametric magnetic resonance imaging before radical prostatectomy predicts the probability of postoperative incontinence.

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Abstract: PURPOSE To evaluate the role of preoperative multiparametric magnetic resonance imaging (MRI) as predictor of post-prostatectomy incontinence (PPI). METHODS We analyzed patients who underwent robot-assisted radical prostatectomy for localized prostate cancer at our institution between July 2015 and April 2017. In these patients, we measured the perfusion quality of the pelvic floor with contrast media kinetics in the preoperative MRI of the prostate and compared the levator ani muscle (region of interest) to the surrounding pelvic muscle structures (reference). Prospectively collected questionnaires regarding urinary incontinence were then evaluated 1 year postoperatively. Outcomes were dichotomized into "continent" (ICIQ-Score = 0-5) and "incontinent" (ICIQ-Score 6). In each patient, we determined the perfusion ratio of the levator ani muscle divided by the surrounding pelvic muscle structures and compared them among the groups. RESULTS Forty-two patients were included in the study (n = 22 in "continent", n = 20 in "incontinent" group). The median perfusion ratio from the continent group was significantly higher compared to the incontinent group (1.61 vs. 1.15; 95% CI 0.09-0.81, p = 0.015). The median perfusion ratio in "excellent" (ICIQ-Score = 0) was significantly higher than in "poor" (ICIQ-Score 11) outcomes (1.48 vs. 0.94; 95% CI 0.04-1.03, p = 0.036). Further, a higher perfusion ratio was negatively correlated with ICIQ-Score (r = - 0.33; 95% CI - 0.58 to 0.03; p = 0.031). CONCLUSIONS Our data demonstrate a promising new strategy to predict PPI through the perfusion quality of pelvic muscle structures with contrast media kinetics. This may facilitate preoperative patient consulting and decision-making.

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Table 1 Patient characteristics and prognostic factors stratified by outcome groups (exploratory p-values attached)

Abbreviations: BMI = Body Mass Index, PSA = Prostate Specific Antigen, ICIQ = International Consultation on Incontinence Questionnaire

Main groups **Postoperative ICIQ-Score**	**Continent (n=22)** **0 - 5 points**	**Incontinent (n=20)** **≥ 6 points**	
	Mean (+/- SD)	*Mean (+/- SD)*	*p-value*
Age (years)	61.2 (8.8)	65.3 (7.2)	0.11
BMI (kg/m^2)	26.0 (3.5)	26.6 (2.4)	0.52
PSA (ng/ml)	6.83 (4.4)	6.69 (3.4)	0.91
Prostate size (ccm)	33.5 (16.1)	34.4 (15.4)	0.86
preoperative ICIQ-Score (0-21)	1.41 (1.3)	1.90 (1.68)	0.29
	n (percent)	*n (percent)*	
Gleason-Score			0.36
7	16 (72.7%)	18 (90%)	
8 - 9	6 (27.3%)	2 (10%)	
Nerve sparing			0.98
bilateral	8 (36.4%)	7 (35%)	
unilateral	7 (31.8%)	6 (30%)	
none	7 (31.8%)	7 (35%)	

Subgroups **Postoperative ICIQ-Score**	**Excellent (n=10)** **0 points**	**Poor (n=10)** **≥ 11 points**	
	Mean (+/- SD)	*Mean (+/- SD)*	*p-value*
Age (years)	60.0 (9.6)	65.0 (8.3)	0.23
BMI (kg/m^2)	26.2 (3.9)	25.8 (2.5)	0.77
PSA (ng/ml)	7.18 (2.3)	7.19 (3.6)	0.99
Prostate size (ccm)	38.6 (19.6)	34.4 (17.63)	0.62
preoperative ICIQ-Score (0-21)	1.60 (1.9)	2.6 (2.12)	0.28
	n (percent)	*n (percent)*	
Gleason-Score			0.082
7	6 (60%)	10 (100%)	
8 - 9	4 (30%)	0 (0%)	
Nerve sparing			0.35
bilateral	4 (40%)	3 (30%)	
unilateral	4 (40%)	2 (20%)	
none	2 (20%)	5 (50%)	